CLAIMS

1. An all-fiber depolarizer comprising:

(a) a polarization beam splitter having two input fibers and two output fibers and a beam splitting region in-between having a polarizing axis;

(b) control means for controllably injecting polarized light from a light source with a given coherence length into one of the input fibers of the polarization beam splitter so that the polarization of the signal entering the beam splitter is circular or linear at a substantially 45° angle from the polarizing axis of the beam splitter;

(c) a loop formed between the second input fiber and one of the output fibers of the beam splitter, said loop being made of a standard non-birefringent fiber and having a length greater than the coherence length of the light source;

(d) the second output fiber receiving and further transmitting incoherent depolarized light produced by the interaction of the polarization beam splitter and the loop.

2. An all-fiber depolarizer according to claim 1, in which the polarization beam splitter is a 2 x 2 beam splitter adapted to divide light entering through one of its input fibers into two linearly polarized beams that are orthogonal and are defined by the polarizing axis of the beam splitter.

3. An all-fiber depolarizer according to claim 1, in which the beam splitting region of the polarization beam splitter is a fused fiber coupler.

4. An all-fiber depolarizer according to claim 1, in which the polarization beam splitter is a broadband polarization splitter.

5. An all-fiber depolarizer according to claim 4, in which the broadband polarization splitter has an all-fiber Mach-Zehnder structure.

6. An all-fiber depolarizer according to claim 1, in which the control means comprise a birefringent polarization maintaining fiber controllably spliced to one of the input fibers.

7. An all-fiber depolarizer according to claim 1, in which the polarization beam splitter is mounted on a suitable substrate to form a unitary structure.

8. An all-fiber depolarizer according to claim 1, in which the control means comprise a birefringent polarization maintaining fiber spliced at an angle of 45° from the polarizing axis of the beam splitter to one of the input fibers of the beam splitter, said beam splitter, including the splicing with the birefringent polarization maintaining fiber, are bonded to a suitable substrate to form a unitary structure.

9. An all-fiber depolarizer according to claim 1, in which the control means comprise a birefringent polarization maintaining fiber spliced at an angle of 45° from the polarizing axis of the beam splitter to one of the input fibers of the beam splitter, said splicing being done outside of a substrate to which the beam splitter is bonded.

10. An all-fiber depolarizer according to claim 1, in which the length of the loop is several times the coherence length of the light source.

11. An all-fiber depolarizer according to claim 1, in which the control means comprise a primary polarization beam splitter having two input fibers and two output fibers, in which one input fiber forms another loop with one output fiber, said loop having a length greater than the coherence length of the light source.

12. An all-fiber depolarizer according to claim 11, in which the loop used with the primary polarization beam splitter is of different length than the loop used with the polarization beam splitter into which light is controllably injected and which is concatenated to and follows the primary beam splitter.